## 4.2 Basis for Comparison of Alternatives and Approach to Alternatives Analysis

The basis for comparing the alternatives described in Section 2, and the approach to the alternatives analysis is briefly described in this section to introduce the methods for predicting the effects of the Proposed Action and alternatives. Technical modeling tools used to analyze the Proposed Action and alternatives are also described.

### 4.2.1 No Action Alternative

NEPA essentially asks how current environmental conditions would change with the Proposed Action or alternatives. Therefore, the environmental consequences analysis of the alternatives requires defining a baseline against which the Proposed Action and alternatives can be evaluated and contrasted. In practice, this baseline is usually either existing conditions (i.e., the affected environment), or the no action alternative (CEQ Regulations at 40 CFR 1502.15). However, although NEPA requires that the alternatives considered for detailed analysis include a no action alternative, neither NEPA nor the CEQ implementing regulations require that the no action alternative be used as the baseline.

For this analysis, the Proposed Action (Alternative 1) most closely approximates current baseline conditions, because the same type of chinook salmon harvest management plan has been implemented since 2000. In situations where the proposed activity is fundamentally the continuation of a current management activity, the proposed action may be defined as the no action alternative because the proposed action represents no change from the baseline environmental condition (CEQ 40 Questions, question 3).[i] This may raise some confusion in relation to the settlement agreement with Washington Trout v. Lohn, in which no authorized take of listed chinook in Puget Sound (Alternative 4) is identified as the no action alternative to describe the case where literally no harvest of listed Puget Sound chinook salmon would occur. For the purposes of this analysis, Alternative 1 (the Proposed Action) is the baseline for comparison of alternatives under NEPA, and Alternative 4 represents the case in which the Proposed Action would not occur. The alternatives analyzed in detail in this

[i] CEQ interpreted the 'no action' alternative in two ways (CEQ 40 Questions, question 3):

1) For a continuing action, such as a long-term plan or program of action, 'no action' is defined as 'no change' from current management direction or level of management intensity.
2) For a project, 'no action' is defined as 'the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward."

Fundamentally, these two interpretations are the same since each is intended to define the environmental baseline conditions that exist prior to the implementation of the proposed activity or its alternatives.

Environmental Impact Statement are compared to one another, as required by NEPA, to obtain a clear understanding of the comparative merits of each alternative.

### 4.2.2 Technical Approach to Impact Assessment

The Affected Environment section of this Environmental Impact Statement (Section 3) describes the effects of fishing that have occurred in the past; however, it does not accurately describe the baseline conditions from which the effects of the Puget Sound chinook salmon harvest alternatives can be determined, due to changing environmental conditions, population abundance and market conditions. Every year, the Washington Department of Fish and Wildlife and the Puget Sound treaty tribes (the co-managers) use a technical model[ii] to evaluate the effects of harvest management regimes against the predicted salmon abundances for the coming year. Therefore, this model could be used to examine the effects of various alternatives on the salmon resource by comparing them under the same set of baseline environmental conditions.

The 2003 fishing year is representative of salmon abundance and fishing patterns in recent years;[iii] therefore, 2003 pre-season expectations and modeling information are used to describe the general pattern of fisheries that would reasonably be expected to occur under Alternative 1, the Proposed Action, over the time period it would be in effect (the ~~2004~~ 2005–2009 fishing seasons). The model was then adjusted from these baseline conditions to predict impacts to salmon for the three harvest management alternatives described in Section 2. This information formed the basis for the alternatives analysis in this Environmental Impact Statement. A detailed description of the modeling assumptions is provided in Appendix C.

The environmental consequences of the Proposed Action and alternatives are affected by the distribution and magnitude of catch or mortality (catch and exploitation rate), available opportunities (sport angler trips), and numbers of fish that remain to reproduce (escapement). For example, the amount of money that comes into a community from fishing depends largely on the amount of fish commercial fishermen catch to sell, the opportunities available to sport fishermen to catch fish, and where those opportunities are available. Predicted effects to Puget Sound tribal treaty rights or subsistence uses are also dependent on access to fish and the available amount of fish. Predicted effects

[ii] The model is called the Fisheries Regulation and Assessment Model (FRAM).

[iii] Pink salmon return to Puget Sound only during odd-numbered years, so 2003 is the most recent year that would include impacts resulting from pink salmon fisheries. Using a year that includes pink salmon fisheries and returning pink salmon adults ensures that impacts to all salmon species are accurately represented.

on fish and wildlife resources are influenced by the encounters of these species with fishing activities and the number of fish that survive to reproduce. The technical model and other sources of available data were used to predict this core set of parameters: catch, exploitation rates, angler trips and escapement.

### 4.2.3 Scenarios for Alternatives

The outcome of implementing any of the alternatives evaluated in the Environmental Impact Statement as measured by the core set of parameters described above will depend on the Puget Sound chinook salmon abundance available to the fisheries in any individual year, and the amount of Puget Sound chinook harvest taken in Canadian and Alaskan fisheries prior to chinook salmon reaching Puget Sound fisheries. For example, chinook salmon populations are more likely to achieve management objectives at higher abundance and/or lower levels of Canadian/Alaskan fisheries, and therefore, fishing opportunity would be expected to be more widely distributed throughout Puget Sound. At lower abundance and/or high levels of Canadian/Alaskan fisheries, the geographic scope of fisheries and the amount of catch would be expected to be substantially reduced. Therefore, the Environmental Consequences analyses incorporate assumptions about the range of chinook salmon abundances and levels of chinook harvest in Canadian/Alaskan fisheries that could reasonably be expected to occur for the duration of the Proposed Action (the ~~2004~~ 2005–2009 fishing seasons).

These different scenarios are used only to explore the range of possible impacts to chinook salmon. The assumptions regarding the range of abundance and Canadian/Alaskan fisheries for coho, sockeye, pink, chum and steelhead are the same among scenarios for two reasons: 1) the purpose of the Proposed Action is to manage Puget Sound chinook salmon. It does not include management objectives for other species or describe how fisheries will respond to changes in abundance of those other salmon species; and, 2) the 1999 Pacific Salmon Treaty Chinook Annex provides the necessary information to model chinook impacts under higher levels of fishing than those observed in recent years, but which might occur in the next few years. However, there is insufficient information to allow modeling how catch of salmon species other than chinook would vary in response to changes in Canadian/Alaskan fisheries. Therefore, the analysis assumes abundance and Canadian/Alaskan fishery impacts for non-chinook salmon species will remain similar to those experienced in recent years.

#### 4.2.3.1 Abundance

Abundance fluctuates due to changes in survival in the marine and freshwater environments through which salmon pass during their life cycle. Evidence suggests that marine survival of salmon species fluctuates in response to 20 to 30-year cycles of climatic conditions and ocean productivity (Mantua

1997; Cramer 1999). Declines in marine survival began to be detected in the early 1990s so marine survival would be expected to continue to be low for the next 10 to 20 years, although there has been some indication that marine survival has increased in the last several years, resulting in increased abundance of West Coast chinook salmon populations. To look at the level of abundance that might be reasonable to expect over the duration of the Proposed Action (the ~~2004~~ 2005–2009 fishing seasons), the pattern of Puget Sound chinook salmon abundance over the last thirteen years (1991 through 2003) was examined since it included periods of low marine survival (1990s),[iv] and what is believed to be higher marine survival (2000 through 2003). Freshwater conditions have not been found to fluctuate in cycles, but the changes in these environments have contributed to the variation in chinook salmon abundance observed in this same period. Total Puget Sound chinook salmon abundance in the 1990s averaged approximately 30 percent less than abundance observed in recent years,[v] so a 30 percent reduction in Puget Sound chinook abundance from the 2003 predicted Puget Sound chinook abundance was chosen for the low abundance condition. It is possible that marine survival could continue to increase, but there are some indications, based on ocean interceptions of immature Columbia River chinook, that abundance of West Coast salmon may decrease in the next few years (personal communication with D. Simmons, NMFS, February 2, 2004). Therefore, the 2003 abundance was chosen to represent the high abundance condition.

#### 4.2.3.2 Canadian and Alaskan Fisheries

In their ocean migration, Puget Sound chinook salmon travel north along the west coast into Canadian waters, and at times as far north as Alaskan waters (Figure 1.4-1). Depending on the population, Canadian fisheries on average can account for as much as 75 percent of the fishing-related mortality on Puget Sound chinook salmon (see Subsection 4.3.1). Alaskan fisheries harvest a low proportion (1 to 2%) of Puget Sound chinook salmon. Although the management of Canadian fisheries is outside the jurisdiction of the co-managers, the level of Canadian/Alaskan fisheries is an important consideration in assessing the total impact of fishing on Puget Sound chinook salmon populations, and the contribution of Puget Sound fisheries to that total impact.

[iv] Marine survival in the 1990s was the lowest observed since the early 1970s.

[v] Although Puget Sound chinook salmon showed the same general trend in abundance, not all populations showed an increasing trend over the same period, and the variability in abundance varied from population to population.

The major Canadian fisheries that currently or in the past have harvested large numbers of Puget Sound chinook salmon include the West Coast Vancouver Island troll and sport fisheries, the Georgia Strait troll fishery and the Georgia Strait and Canadian Strait of Juan de Fuca sport fisheries. In recent years, Canadian fisheries have not harvested chinook salmon at levels allowed under the Pacific Salmon Treaty due to internal Canadian conservation issues (NMFS 2003). The Georgia Strait troll fishery has been virtually eliminated since 1995 (CTC 2003), and that situation is expected to continue because of changes in Canadian management priorities. Also, many of the fishermen previously in the Georgia Strait troll fishery have sold their fishing gear or moved to other fisheries. However, effort and catches in the other Canadian fisheries have been increasing from the record low levels in the most recent few years (CTC 2003). Fishery restrictions implemented in the mid-1990s to address Canadian chinook and coho salmon conservation concerns are likely to be relaxed to some degree in these fisheries in the next several years and may result in increased fisherman participation and catch. Therefore, the Canadian/Alaskan fisheries regime projected to occur in 2003 was chosen as the low northern fisheries condition because for Canadian fisheries other than the Georgia Strait troll fishery, it is unlikely that Canadian catch levels will decrease from those projected to occur in 2003, and more likely that total effort and catch will continue to increase from 2003 levels.

Maximum harvest levels expected to occur under the Pacific Salmon Treaty during implementation of the 2004–2009 RMP were modeled to represent the upper range of impacts associated with Canadian fisheries (i.e., worst case scenario). These maximum expected levels are not the maximum allowed under the Pacific Salmon Treaty, but the maximum reasonably expected to occur during the ~~2004~~ 2005–2009 fishing seasons, based on recent fishing patterns, shifts in fishing sector allocation over the past 10 years, and discussions with Canadian fishing managers (personal communication with D. Simmons, NMFS, Pat Pattillo, WDFW, and Larrie Lavoy, WDFW, July 2003). The maximum Canadian/Alaskan fisheries expected to occur during the 2004–2009 fishing seasons assumed: 1) the West Coast Vancouver Island troll and sport fishery would occur under the maximum level allowed under the Pacific Salmon Treaty; 2) the Georgia Strait troll fishery would remain at very low levels; and, 3) the Georgia Strait and Canadian Strait of Juan de Fuca sport fisheries would occur at the highest estimated catch level observed for the period 1994–2002. ~~A more detailed discussion of Canadian harvest patterns and the basis of the maximum northern fisheries scenario is included in Appendix B.~~

Taking into account the information on both abundance and expected northern fishing patterns described above, four scenarios were developed by the Interdisciplinary Team that encompass the

range of abundance and northern fishing conditions that might reasonably be expected to occur during the implementation of the Proposed Action (Table 4.2-1).

Table 4.2-1. Scenarios associated with estimated harvest levels within the Puget Sound Action Area.

| Scenario | Abundance | Alaskan/Canadian Fisheries |
|---|---|---|
| Scenario A | 2003 Puget Sound abundance | 2003 Canadian/Alaskan fisheries harvest |
| **Scenario B** | **2003 Puget Sound abundance** | **high Canadian/Alaskan fisheries harvest** |
| Scenario C | 30% reduction from 2003 abundance | 2003 Canadian/Alaskan fisheries harvest |
| Scenario D | 30% reduction from 2003 abundance | high Alaskan/Canadian fisheries harvest. |

The indications of a plateau or potential reduction in marine survival and expectations that Canadian fisheries will continue to increase as they have in recent years led the Interdisciplinary Team to conclude that Scenario B is the *most likely* to occur during the implementation of the Proposed Action. Consequently, the assessment of environmental consequences in the following subsections focus on comparisons to this alternative. The results under Scenarios A, C, or D are also reported, but in less detail.